

MODIS DATA STUDY TEAM PRESENTATION

March 15, 1991

AGENDA

1. Action Items
2. Data Compression Workshop Viewgraphs

ACTION ITEMS:

02/15/91 [Team]: Review letter from Bill Browne requesting information on geo-location, orbit knowledge and control, and instrument pointing requirements for MODIS-T and determine answers (if known). Respond to B. Browne by February 21, 1991. Delivered to D. Han Feb. 22, 1991. STATUS: Closed.

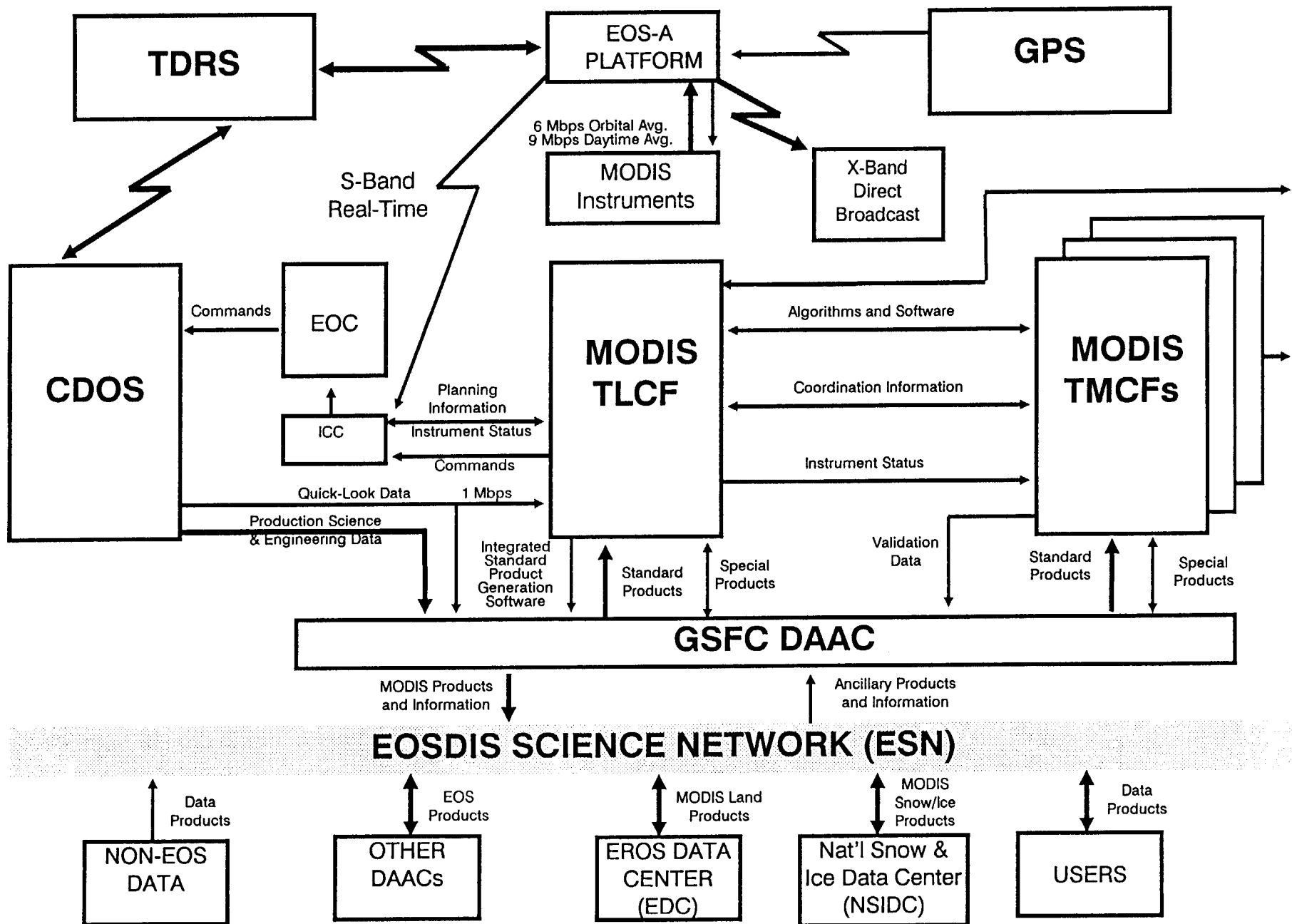
03/08/91 [Watson Gregg]: Make changes in the Earth Model reports and deliver to Al Fleig. Delivered to Al Fleig. STATUS: Closed.

03/08/91 [Lloyd Carpenter; Team]: Prepare slides for presentation by V. Salomonson at Data Compression Workshop. The slides should emphasize the data requirements of MODIS, especially those amenable to data compression techniques. Due March 22, 1991. STATUS: Progress Report in this week's handout.

NEED FOR DATA COMPRESSION

- **Data Storage**
- **Data Distribution**
- **Browse Data**
- **Direct Link (Direct Broadcast)**

END-TO-END MODIS DATA FLOW FROM INSTRUMENT TO USERS



MODIS Data Volume Estimates (TeraBytes Per Year)

Level-0	Level-1A	Level-1B	Level-2
28	34	50	22

Data Rate Comparison MODIS vs. Heritage Instruments

	HIRS	CZCS	AVHRR		MODIS-T	MODIS-N			
			GAC	LAC		1 km	500 m	250 m	Total
PIXELS/LINE	56	1,968	409	2,048	1,007	1,354	2708	5416	
LINES/SECOND	0.2	6.0	2	6	6.5	6.7	13.4	26.9	
VIS BANDS	1	5	2	2	32	12	3	2	
IR BANDS	19	1	3	3	0	17	2	0	
BIT QUANT	13	8	10	10	13	12	12	12	
VIS COVERAGE	100%	8%	50%	10%	50%	50%	50%	50%	
IR COVERAGE	100%	8%	100%	10%	0%	100%	100%	100%	
VIS RATE (Kbps)	0.1	37.8	8.2	24.6	1,360	653	653	1748	3055
IR RATE (Kbps)	2.8	7.6	24.5	36.9	0	1851	871	0	2722
AVG RATE (Kbps)	2.9	45.3	32.7	61.4	1,360	2504	1524	1748	5777

RATIO OF MODIS TO HIRS	2461
RATIO OF MODIS TO CZCS	158
RATIO OF MODIS TO AVHRR	76
RATIO OF MODIS TO ALL ABOVE	50

MODIS DATA DISTRIBUTION (GigaBytes Per Day)

FROM	TO	DATA DESCRIPTION	DATA VOLUME
CDOS	GSFC	All Level-0 Products	77
GSFC	EDC	Level-2 Land Products	42
GSFC	MODIS Investigators	10% of Level-1A Products 50% of Level-1B Products	78
GSFC	Other Investigators	5% of Level-1B Products	7
GSFC	Langley Research Center	100% of Level-1B Products	137

BROWSE DATA

- **Subsampled in Time and Space**
- **May Need a Lossy Compression Technique That Preserves Features**
- **Progressive Image Delivery**

DIRECT LINK

Data Rate

1.0 (GBytes/day)

ISSUES

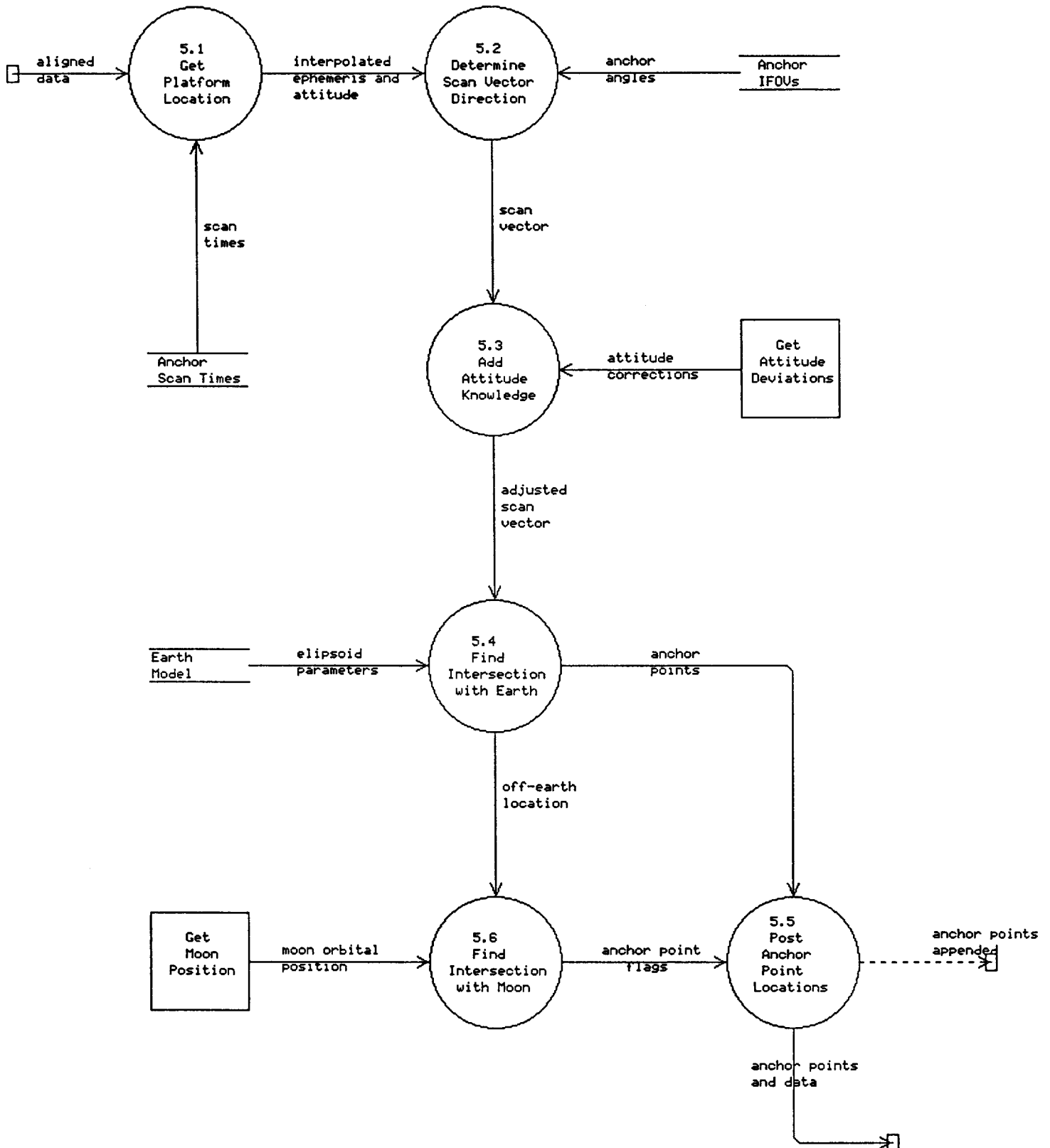
- **Transparent**
- **Impact on Processing**
- **Reliability/Risk**
- **Off-the-Shelf vs. Special Purpose (Hardware/Software)**
- **Cost**

Appendix

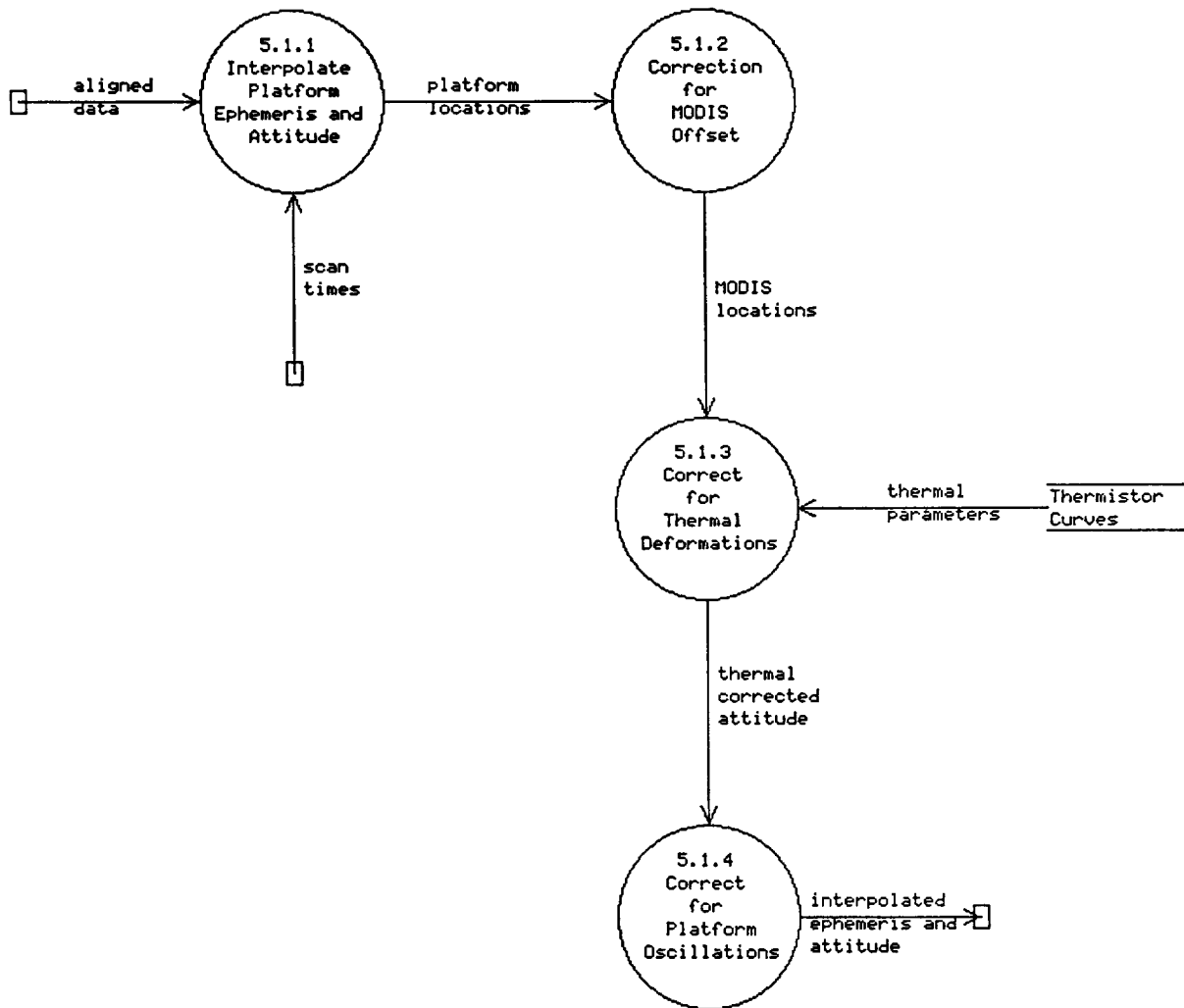
**to the
MODIS Data Study Team Presentation
March 15, 1991**

Level-1B Data Flow Diagrams

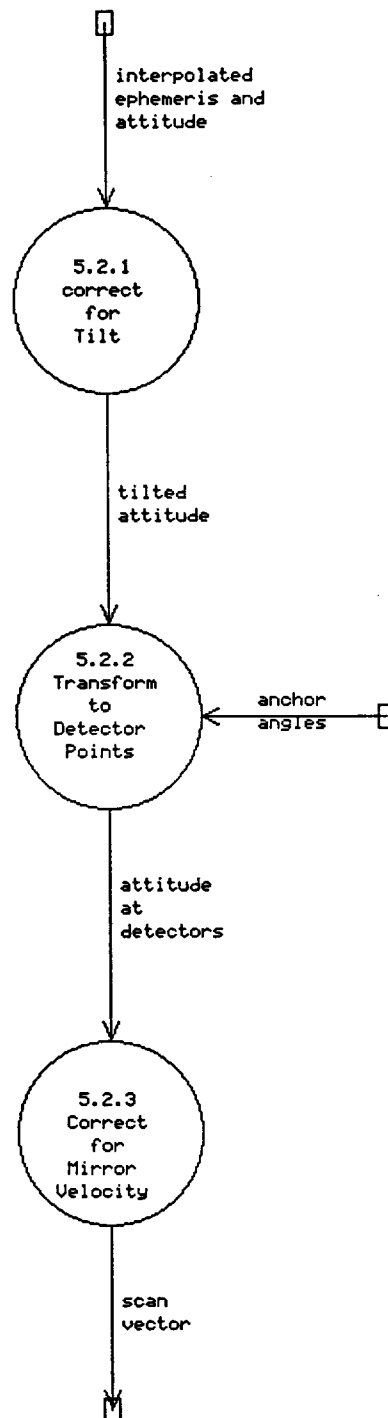
Project : \ECPLUS\MODIS-1B\
Chart : level-b5
Filename : level-b5.trg
Last Modified : 03-14-1991



Project : \ECPLUS\MODIS-1B\
Chart : 1v1-c51
Filename : 1v1-c51.trg
Last Modified : 03-14-1991



Project : \ECPLUS\MODIS-1B\
Chart : 1v1-c52
Filename : 1v1-c52.trg
Last Modified : 03-14-1991



Abort

Type: Control Flow
Location: 7.6 7.4

An indication to perform an immediate abort by releasing system resources (memory and disk space) and posting a termination message to the SCA.

Abort Cleanup

Type: Control Transform
Location: 1.3

Processes termination messages into the proper flow control items: either a graceful termination (all files written and closed) or abort-now condition (immediate termination without posting files). Posts an entry to the Processing Log.

Add Attitude Knowledge

Type: Data Process
Location: 5.3

Correct the computed instrument scan vector for any empirically derived anomalies. These may be derived from ground control point convolutions or other techniques and are contained in a periodically updated database. DEM and refraction may be added ere.

Adjusted Scan Vector

Type: Data Flow
Location: 5.3 5.4

The sensor scan vector corrected for any perturbations - derived or observed.

Aligned Data

Type: Data Flow
Location: 4.3 5.1

MODIS data that has been placed into a valid computer data word type.

Allocation Parameters

Type: Data Flow

Location: Memory Allocation 2.3

A request to the operating system for storage allocation and a response with the storage parameters or alternately, an error message.

Anchor Angles

Type: Data Flow

Location: Anchor IFOVs 5.2

The angular offsets from the instrument nadir vector for each of the anchor points.

Anchor IFOVs

Type: Data Store

Location: 5.2

A data store containing the scan definitions of the points for which ground anchor locations will be computed.

Anchor Point Flags

Type: Data Flow

Location: 5.6 5.5

Flags indicating the presence of a scan vector to Moon intersection. Pixel data and scan vector angles may be saved here for calibration and attitude purposes.

Anchor Points

Type: Data Flow

Location: 5.4 5.5

The location of the ground anchor points in Earth coordinates.

Anchor Points Appended

Type: Control Flow

Location: 5.0 6.1

An indication that the ground location anchor points have been appended to the granule (scene).

Anchor Points and Data

Type: Data Flow

Location: 5.0 Granule Structure

A quantum of level-1A data, byte aligned and with ground located anchor points appended.

Anchor Scan Times

Type: Data Store

Location: 5.1

The spacecraft offset times from the reference scan cube time for each of the ground anchor points. This is a function of the instrument scan rates.

Append Header

Type: Data Process

Location: 7.3

Create and append the granule header. This is a superset of the Metadata items.

Apply Calibration Curves

Type: Data Process

Location: 6.3

For every science pixel, apply the calibration equations taking the gain bit into consideration. Test for inconsistencies and generate SCA reports, invalid flags, and default values.

Attitude Corrections

Type: Data Flow

Location: Get Attitude Deviations 5.3

Small correction angles used to further improve the attitude information.

Attitude at Detectors

Type: Data Flow

Location: 5.2.2 5.2.3

The scan cube with anchor points that has been corrected for the detector positions.

Availability Indices

Type: Data Flow

Location: 2.1 DADS

An enquiry to and a response from the external database containing a map of the data set sizes and completeness that is used to determine if the MODIS Level-1B processing can be properly performed.

Bad Pixels

Type: Data Flow

Location: 6.3 6.5

Pixels of data that can not be calibrated properly. This is used for Data Quality Assessment. This function can be expanded to include data validation.

Begin

Type: Control Flow

Location: 2.4 3.1

An indication to begin processing MODIS data.

Byte Align Data

Type: Data Process

Location: 4.0

Extract the data from the scan cube and byte/word align it. This places the data into a valid computer data type.

Calibrate and Convert

Type: Data Process

Location: 6.0

Convert the raw counts data to their physical measurements. Science data to albedo or energy values, engineering data to temperatures, positions, rates, etc.

Calibrated Data

Type: Data Flow

Location: 6.4 Granule Structure

The data contained in the granule subset (quantum or scan cube) that is converted from instrument digital counts to the proper science or engineering dimensional units.

Calibrated Pixels

Type: Data Flow

Location: 6.3 6.4

Science data values that have been calibrated to at instrument radiances.

Calibration Coefficients

Type: Data Store

Location:

Parameters used to calibrate both the engineering and the science data from the instrument. This includes any instrument characterization information.

Calibration OK

Type: Control Flow

Location: 6.4 7.1

An indication that the MODIS data has been calibrated and converted to its final Level-1B format.

Calibration Parameters

Type: Data Flow

Location: 1.2 6.1 via Calibration Coeff

Any data values or algorithms that are used to calibrate the instrument data.

Calibration Target Values

Type: Data Flow

Location: 6.1 6.2

Data values that may be used to perform calibration on the science pixel values. This may include temperatures or non-Earth pointing data values.

Check Data Availability

Type: Data Process

Location: 2.1

Perform a verification that the data (MODIS Level-1B granule and Metadata) required to complete the output granule is available to this MODIS Level-1B program.

Check Granule Completeness

Type: Data Process

Location: 3.2

Determine if the computer output granule store has been posted to disk and enable this store initialization if true.

Clean Up

Type: Control Flow

Location: 7.4 7.5

An indication to perform the final clean up of data stores, posting a post event record to the SCA via this program's control mechanism.

Cleanup Memory

Type: Data Process

Location: 7.5

Deallocate the computer memory and disk store areas.

Continue

Type: Control Flow

Location: 1.3 3.2

An indication to continue the processing of MODIS data.

Control

Type: Control Flow

Location: SCA 1.1

Messages from the EOSDIS scheduler containing start, finish, and requests for dynamic status.

Correct for Mirror Velocity

Type: Data Process

Location: 5.2.3

Correct the anchor point vectors for any anomalies in the position of the scan mirror as a function of time or mirror position.

Correct for Platform Oscillation

Type: Data Process

Location: 5.1.4

Correct the MODIS attitude (and position) for oscillations due to other instruments. This requires knowledge of the dynamics of other devices derived from the ancillary data stream attached to the MODIS level-1A data product.

Correct for Terrain Elevation

Type: Data Process

Location: 5.4

Perform an iterative correction to the Earth - scan vector intersection to correct for Earth terrain elevation. This can be performed as a correction to the Earth radius in the Ellipsoid model. A limited iteration predictor corrector method will be used.

Correct for Thermal Deformations

Type: Data Process

Location: 5.1.3

Correct the MODIS instrument attitude (and position) for platform thermal deformations. Thermal data is obtained from the telemetry stream and calibrated with thermistor curves.

Correct for Tilt

Type: Data Process

Location: 5.2.1

Correct the anchor points for the MODIS-T Tilt angle. Account for any instrument tilt settling dynamics.

Correction for Modis Offset

Type: Data Process

Location:

Perform a coordinate transformation to correct the platform position and attitude to the MODIS position and attitude.

DADS

Type: External Entity
Location: 2.0 4.0

Data Archive and Distribution System. The EOSDIS core system program that manages the input and output product databases.

Data Available

Type: Control Flow
Location: 2.1 2.2

An indication that the data sets required to process the output granule(s) are available from the external database storage. This is expected to be in the form of database indices.

Data In

Type: Data Flow
Location: DADS 4.1

Level-1A data products generated by the MODIS Level-1A program. This consists of the Level-1A data granule and the Level-1A Metadata.

Data Processed

Type: Control Flow
Location: 7.0 1.4

An indication that data has been processed and more data is needed. This also indicates the completion of a granule (scene) of data.

Decompose Control Message

Type: Control Transform
Location: 1.1

Decomposes the incoming message to determine the type of message and where to send it.

Derive Calibration Sensor Values

Type: Data Process
Location: 6.1

Find quantitative values for calibration known values. This includes in-situ (on Earth), off Earth, and/or on instrument spots. Also included are dark current and per sensor array element corrections.

Derive Status

Type: Control Transform
Location: 1.4

Handles problem (alarm) and event messages as well as data termination messages, posts entries to the Processing Log, and passes a Post Processing message to the SCA.

Detect Calibration Anomalies

Type: Data Process
Location: 6.2

Look for inconsistencies in the calibration targets defined in 6.1. Alert the SCA of any problems, assume default conditions, and flag the data as incompletely calibrated.

Determine Data Quality

Type: Data Process
Location: 6.5

Derive any data quality indications for both the post processing record and the Metadata (and headers).

Determine Granule Completeness

Type: Data Process
Location: 7.1

Determines if an output granule (scene) has been completed. If so, pass the granule to further processing. If not, indicate to the control processes that more data needs to be processed.

Determine Ground Location

Type: Data Process
Location: 5.0

Determine the ground anchor points and append this data to the output granule.

Determine Memory Requirements

Type: Data Process
Location: 2.2

Calculate the memory and disk size requirements, knowing the processing mode, number of output granules, or other parameters.

Determine Scan Vector Direction

Type: Data Process

Location: 5.2

Using the spacecraft attitude and instrument geometry, determine the look angles for each anchor point. This includes instrument attitude corrections such as tilt, scan mirror velocities, and detector geometry.

Determine Termination Type

Type: Control Transform

Location: 7.6

Derive the abort or graceful termination type.

Determine and Transmit Granule

Type: Data Process

Location: 7.0

Perform final accounting at the output granule (scene) level. Create the granule header. Update or generate the metadata items. Transmit the data to the PMS. Deallocate memory and disc stores.

Dynamic Status

Type: Control Flow

Location: 1.0 7.0

The request for and returning of dynamic status information.

Dynamic Status Request

Type: Control Flow

Location: 1.1 7.1

A message originating via the SCA requesting that current processing information be posted into a return message. See Dynamic Status Response.

Dynamic Status Response

Type: Control Flow

Location: 7.1 1.4

An internally generated message to be sent to the SCA that indicates the current status (accounting) of the data processing task. See also Dynamic Status Request.

Earth Model

Type: Data Store
Location: 5.4

The description of the Earth ellipsoid.

Ellipsoid Parameters

Type: Data Flow
Location: Earth Model 5.4

The parameters used in the Earth ellipsoid model

Event, Anchor Points

Type: Control Flow
Location: 5.0 1.4

An anomaly has occurred in the calculation of the anchor points. This may indicate an off Earth point, Moon looking point, illegal point, or a numerical problem.

Event, Instrument

Type: Control Flow
Location: 4.3 1.4

An indication that an instrument event has been detected with a description of that event.

Find Intersection with Earth

Type: Data Process
Location: 5.3

Perform an analytical computation to determine the intersection of the scan pointing vector and the Earth ellipsoid. Determine if this intersection exists. Also determine if this is a Moon looking scan. This is still in the inertial coordinate system.

Find Intersection with Moon

Type: Data Process
Location: 5.6

Calculate the intersection of the scan vector with the Moon. Set the Land Sea Moon Space flag accordingly. Pixels looking at the Moon can be used for calibration and scan angles at the Moon boundaries can be used for attitude correction.

Finished Granule

Type: Control Flow
Location: 7.1 7.2

An indication that a granule of output data has been completed.

Geographic Location

Type: Data Flow
Location: 5.3 5.4

The locations in Earth coordinates of the intersections of the IFOV scan vectors and the Earth ellipsoid surface.

Get Attitude Deviations

Type: External Entity
Location: 5.3

A process (currently external) that returns the small attitude corrections required to correct the attitude accuracy to an attitude knowledge specification. This may consist of platform and instrument deformations, and ground control point corrections.

Get Moon Position

Type: External Entity
Location: 5.6

A routine that returns the position and size of the Moon given a UTC time.

Get Platform Location

Type: Data Process
Location: 5.1

Obtain the spacecraft location and attitude in the inertial coordinate system coincident with the time of each ground anchor point scan. This includes MODIS platform offsets, thermal deformations, and oscillations due to other instruments.

Get Terrain Elevation

Type: External Entity
Location: 5.4

Returns the elevation of the Earth surface at the specified Earth location. This elevation is referenced to the Earth oblate ellipsoid.

Graceful Termination

Type: Control Flow

Location: 7.6 7.1

An indication to perform a graceful, post data and update metadata, termination.

Granule Data

Type: Data Flow

Location: Granule Structure 7.1

The data contained within the granule.

Granule Incomplete

Type: Control Flow

Location: 7.1 1.0

An indication that a data granule is not complete and more data is needed.

Granule Initialization

Type: Data Flow

Location: 3.1 Granule Structure

Data values that initialize the internal granule store area to invalid data indicators.

Granule Location

Type: Data Flow

Location: 2.3 2.4

The memory addresses and file names of the data stores.

Granule Outline

Type: Data Flow

Location: 2.4 Granule Structure

Address, sizes and types of the MODIS Level-1B granule store area. Initialization does not occur here.

Granule Structure

Type: Data Store

Location: 2.0, 3.0, 4.0 5.0, 6.0, 7.0

The storage area for the data set granule (scene) containing a header with metadata values and instrument science and engineering data. Ancillary data such as calibration coefficients is also included.

Granule With Header

Type: Data Flow

Location: 7.3 Granule Structure

The data granule (scene) with header information attached.

Granule and Metadata

Type: Data Flow

Location: 7.3 7.4

The fully completed Level-1B data granule (scene) and its Metadata.

Initialization Complete

Type: Control Flow

Location: 3.1 4.1

An indication that the output granule (scene) store has been initialized with invalid data indicators.

Initialization OK

Type: Control Flow

Location: 3.1, 3.2 4.1

An indication that the internal granule storage area has been initialized with invalid data indicators.

Initialize Granule

Type: Control Flow

Location: 3.2 3.1

An indication to place the invalid data indicators into the output granule (scene) store.

Initialize Output Granule

Type: Data Process

Location: 3.0

Place invalid value indications into the output granule (scene) storage area in preparation for the next granule processing.

Initiate Termination

Type: Control Flow

Location: 1.1 1.3

An indicator to begin program execution termination. This may be either an abort-now (close files, deallocate memory) or graceful termination (post data before abort).

Input

Type: Data Flow

Location: Context Diagram

Consists of: Level-1A data or quick-look and locally maintained databases. (S/C ancillary data is included in the Level-1A data at this time.)

Interpolate Platform Ephm & Att.

Type: Data Process

Location: 5.1.1

Using the aligned data, interpolate the platform ephemeris and attitude for each ground anchor point.

Interpolated Ephemeris & Att.

Type: Data Flow

Location: 5.1 5.2

The spacecraft platform ephemeris and attitude and the time of the ground anchor points.

Level-1B Granule

Type: Data Flow

Location: Granule Structure 7.4

The final processed MODIS Level-1B data granule.

Log Entry

Type: Data Flow

Location: 1.2, 1.3, 1.4 Processing Log

A record to be posted in the EOSDIS (or other) master Processing Log. This provides an audit trail.

MODIS Locations

Type: Data Flow

Location: 5.1.2 5.1.3

The anchor point data within the scan cube which has been corrected for the MODIS platform location and relative attitude.

MODIS-1B Product Generation

Type: Data Process

Location: Context Diagram

The processor of MODIS Level-1A data products into MODIS Level-1B data products.

Memory Allocation

Type: External Entity

Location:

An operating system memory (and disk) allocation routine. A process requests storage allocation and the system returns error or location parameters.

Memory Requirements

Type: Data Flow

Location: 2.2 2.3

The derived size of the Level-1B storage areas needed to process the output granules (scenes) of data.

Metadata Items

Type: Data Flow

Location: Metadata Structure 7.3

The items in the Metadata structure that are updated or derived in this MODIS Level-1B program.

Metadata Outline

Type: Data Flow

Location: 2.4 Metadata Structure

Addresses, sizes, and types of the metadata store allocation. This sets up the metadata memory area and initializes that area with Level-1A metadata values and additional predefined values representing invalid data.

Metadata Structure

Type: Data Store
Location: 2.0, 7.0

The storage area for the MODIS Level-1B metadata values.

Metadata Updated

Type: Control Flow
Location: 7.2 7.3

An indication that the Metadata has been successfully updated.

Modified Ellipsoid

Type: Data Flow
Location: 5.4 5.3

A modification to the size of the Earth oblate ellipsoid to correct for the terrain elevation at an IFOV point.

Modify and Append Metadata

Type: Data Process
Location: 7.2

Update any Metadata items and derive any new ones. This are placed into the enlarged Metadata store.

Moon Orbital Position

Type: Data Flow
Location: Get Moon Position 5.6

Given the UTC time, return the position and size of the moon at the specified time.

Next Data

Type: Control Flow
Location: 3.2 4.1

An indication that the MODIS Level-1B program is ready for the next quantum of input data.

OK Target Values

Type: Data Flow
Location: 6.2 6.3

Data values that may be used for calibration that have passed quality checks. This includes bounds and other sanity checks.

Off-Earth Location

Type: Data Flow

Location: 5.3 5.6

Scan vectors that are not pointing at the Earth.

Output

Type: Data Flow

Location: Context Diagram

Consists of Level-1B products, Processing Log entries, Metadata, Browse data, and/or quick-look products.

Output Products

Type: Data Flow

Location: 7.4 PMS

MODIS Level-1B Products consisting of the data granules (scenes), enlarged Metadata, and Browse data. The products may be standard, reprocessed, or quick-look. The products can be either file names or file contents.

PMS

Type: External Entity

Location: 7.0

Product Management System. Performs management of processed data, adds further data quality (metadata) information before passing the data to the DADS.

Place Invalid Indicators

Type: Data Process

Location: 3.1

Put invalid data value indicators into the predefined output granule (scene) store in computer memory. This provides an indication of granule completeness in the data granule without accessing the Metadata.

Platform Locations

Type: Data Flow

Location: 5.1.1 5.1.2

The interpolated platform location and attitude for each anchor point appended to the aligned scan cube data.

Post Anchor Point Locations

Type: Data Process

Location: 5.5

Convert from inertial to Lat-Long coordinate system and post the anchor point data to the output granule (scene). Determine the solar and satellite, azimuth and elevation angles and append these to the output granule.

Problem, Calibration

Type: Control Flow

Location: 6.2, 6.3 1.4

An alarm indicating a serious problem in the calibration of the instrument. This may be a loss of calibration parameters, numerical problems, or out of bounds condition.

Problem, Data

Type: Control Flow

Location: 4.1 1.4

An alarm that indicates that invalid MODIS Level-1A data has been received from the DADS.

Problems and Events

Type: Control Flow

Location: 4.1, 4.3 1.4

Any alarms or events that are to be detected at this Level-1B processing. This is probably a duplicate of the processing in the Level-1A program.

Problems, Initialization

Type: Control Flow

Location: 2.1 1.4

An alarm message indication that a serious problem has occurred in the initialization of required store areas. This could be computer memory or disk memory.

Process Control

Type: Control Flow

Location: Context Diagram

The SCA control of the initialization, dynamic status requesting, and termination of this program.

Process Control

Type: Control Transform

Location: 1.0

Handles the control functions of this program. Accepts and sends control information to/from the SCA.

Process Status

Type: Control Flow

Location: Context Diagram

The interface with the SCA consisting of Post Processing Status, Dynamic Status Response, Alarms, and Events.

Processing Log

Type: External Entity

Location: 1.0

Log of processing status records, time sequential events. This is not the current status, but a time based history of status events.

Processing Mode

Type: Control Flow

Location: 1.2 2.2

The mode of processing (standard, reprocessing, quick-look) with any size parameters required.

Processing Status Information

Type: Control Flow

Location: 1.4 SCA

Information regarding the fault conditions and processing performance of this program. Status or completion information from the MODIS process to the SCA with abnormal, dynamic, or normal termination information.

Replace Raw with Calibrated Data

Type: Data Process

Location: 6.4

Place the calibrated data values into the proper output granule (scene) location.

Request Memory

Type: Data Process

Location: 2.3

Ask the operating system for system resources to allow the processing of this data set. This includes both computer memory and disk memory.

SCA

Type: External Entity

Location: 1.0

Schedule, Control, and Accounting. An EOSDIS core system process that performs scheduling, control, and accounting of the various Product Generation System (PGS) programs.

Scan Times

Type: Data Flow

Location: Anchor Scan Times 5.1

The time offsets for each anchor point within the instrument scan.

Scan Vector

Type: Data Flow

Location: 5.2 5.3

The pointing direction of the instrument field of view (IFOV) at the selected anchor point scan positions.

Setup Data Output Structures

Type: Data Process

Location: 2.0

Setup the memory areas and the Output Data Product areas in computer memory and disk. Preallocate these data and metadata areas.

Setup MODIS Data Stores

Type: Data Process

Location: 2.4

Determine all data stores. Initialize the "yet to be determined" Metadata items to an invalid condition.

Setup Processing Mode

Type: Control Transform

Location:

Derives the mode parameters, posts an entry to the system Processing Log, and starts the show.

Start

Type: Control Flow

Location: 1.2 2.1

An indication to start the processing of MODIS Level-1B data.

Start Process

Type: Control Flow

Location: 1.1 1.2

The result of an "Initiate processing" message type being passed to this MODIS Level-1B program from the SCA.

Termination

Type: Control Flow

Location: 1.3 7.6

An indication for the program to terminate immediately (abort) or gracefully (post remaining data). Either termination will cleanup and return any files or memory areas used to the operating system.

Terrain Elevation

Type: Data Flow

Location: Get Terrain Elevation 5.4

Given an Earth location, return the elevation above the reference ellipsoid.

Thermal Corrected Attitude

Type: Data Flow

Location: 5.1.3 5.1.4

The anchor point data within the scan cube that has been corrected for and platform thermal deformations.

Thermal Parameters

Type: Data Flow

Location: Thermistor Curves 5.1.3

The parameters for the conversion from engineering counts to temperatures.

Thermistor Curves

Type: Data Store

Location: 5.1.3

Parameters for converting engineering data to temperatures.

Tilted Attitude

Type: Data Flow

Location: 5.2.1 5.2.2

The scan cube with the interpolated positions and attitudes corrected for any MODIS-T tile angles.

Transform to Detector Points

Type: Data Process

Location: 5.2.2

Transform the anchor point attitudes to the detector positions for each anchor point field of view.

Transmission Complete

Type: Control Flow

Location: 7.4 1.0

An indication that the Level-1B data products have been transmitted to the PMS.

Transmit Data Products

Type: Data Process

Location: 7.4

Transmit the Level-1B data products by either file name or records to the PMS

Unpack Data

Type: Data Process

Location: 4.2

Unpack the 12 bits plus scaling bit into a computer recognizable data type. This is to be performed in place to minimize store area sizes.

Unpacked Data

Type: Data Flow

Location: 4.2 4.3

The input data quantum in an unpacked (byte aligned) form.

Updated Metadata

Type: Data Flow

Location: 7.2 Metadata Structure

Items from the previous Level-1A Metadata that are to be updated and any new Metadata items for Level-1B.

Verified Data

Type: Data Flow

Location: 4.1 4.2

A MODIS Level-1A data quantum that has passed verification checks.

Verify Data Quantum

Type: Data Process

Location: 4.1

Ask for a quantum of MODIS Level-1A data and verify that a piece of valid data has been received. Generate a problem alarm if invalid data has been detected.

Verify Selected Data

Type: Data Process

Location: 4.3

Perform any data value integrity tests. This may include items not visited in the Level-1A program in addition to newer items as defined during this processing level.